

SECTION 15030

ELECTRICAL REQUIREMENTS FOR MECHANICAL EQUIPMENT

PART 1 - GENERAL

1.1 Related Documents

- A. All sections of Division 1.
- B. Examine all drawings and all other Sections of the Specifications for requirements therein affecting the work of this Section. Work shall be coordinated with other trades prior to installation to prevent interference and relocations.
- C. Related Sections: Separate electrical components and materials required for field installation and electrical connections are specified in Division 16.

1.2 Summary

- A. This section specifies the basic requirements for electrical components which are an integral part of packaged mechanical equipment. These components include, but are not limited to, motors, motor starters, and disconnect switches. These components are furnished by Division 15 and installed, at the factory, by the mechanical equipment manufacturer.
- B. The basic requirements for electrical components which are not an integral part of mechanical equipment are specified in Division 16. These electrical components that serve mechanical equipment include, but are not limited to, motor starters. These components are furnished by Division 15 and installed by Division 16, except for manual starters for single phase motors of 1 horsepower or less that are provided in Division 16.
- C. Except as noted above, or indicated otherwise in a specific section of the specifications, all motor starters are furnished by Division 15.
- D. Specific electrical requirements (i.e. horsepower and electrical characteristics) for mechanical equipment are scheduled on the Drawings.

1.3 References

- A. NEMA Standards MG 1: Motors and Generators.
- B. NEMA Standard ICS 2: Industrial Control Devices, Controllers and Assemblies.
- C. NEMA Standard 250: Enclosures for Electrical Equipment
- D. NEMA Standard KS 1: Enclosed Switches
- E. Comply with National Electrical Code (NFPA 70).

1.4 Submittals

- B. No separate submittal is required. Submit product data for motors, starters, and other electrical components with submittal data required for the equipment for which it serves, as required by the individual equipment specification sections.

1.5 Quality Assurance

- A Electrical components and materials shall be UL labeled.

PART II – PRODUCTS

2.1 Motors

- A. The following are basic requirements for simple or common motors. For special motors, more detailed and specific requirements are specified in the individual equipment specifications.
 - 1. Torque characteristics shall be sufficient to satisfactorily accelerate the driven loads.
 - 2. Motor sizes shall be large enough so that the driven load will not require the motor to operate in the service factor range.
 - 3. 2-speed motors shall have 2 separate windings on poly-phase motors.
 - 4. Temperate Rating: Rated for 40°C environment with maximum 50°C temperature rise for continuous duty at full load (Class A Insulation).
 - 5. Starting capability: frequency of starts as indicated by automatic control system, and not less than 5 evenly time spaced starts per hour for manually controlled motors.
 - 6. Service Factor: 1.15 for poly-phase motors and 1.35 for single-phase motors.
 - 7. Motor construction: NEMA Standard MG 1, general purpose, continuous duty, Design "B", except "C" where required for high starting torque.
 - a. Frames: NEMA Standard No. 48 or 54; use driven equipment manufacturer's standards to suit specific application.
 - b. Bearings:
 - 1.) Ball or roller bearings with inner and outer shaft seals;
 - 2.) Re-greasable, except permanently sealed where motor is normally inaccessible for regular maintenance;
 - 3.) Designed to resist thrust loading where belt drives or other drives produce lateral or axial thrust in motor;
 - 4.) For fractional horsepower, light duty motors, sleeve type bearings are permitted.
 - c. Enclosure Type:
 - 1) Open drip-proof motors for indoor use where satisfactorily housed or remotely located during operation;
 - 2) Guarded drip-proof motors where exposed to contact by employees or building occupants;
 - 3) Weather protected Type I for outdoor use, Type II where not housed;
 - d. Overload protection: built-in thermal overload protection and, where indicated, internal sensing device suitable for signaling and stopping motor at starter.

- e. Noise rating: "Quiet"
- f. Efficiency: "Energy Efficient" motors shall have a minimum efficiency as scheduled in accordance with *[ASHRAE 90.1][IEEE Standard 112, test method B]. If efficiency is not specified, motors shall have a higher efficiency than "average standard industry motors"[, in accordance with IEEE Standard 112, test method B].
- g. Nameplate: indicate the full identification of manufacturer, ratings, characteristics, construction, special features and similar information.

2.2 Starters, Electrical Devices, and Wiring

A. Motor Starter Characteristics:

- 1. Enclosures: NEMA 1, general purpose enclosures with padlock ears, except in wet locations shall be NEMA 3R with conduit hubs, or units in hazardous locations which shall have NEC proper class and division.
- 2. Type and size of starter shall be as recommended by motor manufacturer and the driven equipment manufacturer for applicable protection and start-up condition.
- 3. Starters shall be equipped with hand-off-auto switches, or hand-off-auto switches shall be included as part of the controls, in either case when switched to "hand" motor shall operate regardless of signal from the controls.

B. Manual switches shall have:

- 1. Pilot lights and extra positions for multi-speed motors.
- 2. Overload protection: melting alloy type thermal overload relays.

C. Magnetic Starters:

- 1. Maintained contact push buttons and pilot lights, properly arranged for single speed or multi-speed operation as indicated.
- 2. Trip-free thermal overload relays, each phase.
- 3. Interlocks, pneumatic switches and similar devices as required for coordination with unit manufacturer's control requirements.
- 4. Built-in 120 volts control circuit transformer, fused from line side, where service exceeds 240 volts.
- 5. Externally operated manual reset.
- 6. Under-voltage release or protection.

D. Motor Connections:

1. Flexible conduit, except where plug-in electrical cords are specifically indicated.

2.3 Capacitors

A. Features:

1. Individual unit cells
2. All welded steel housing
3. Each capacitor internally fused
4. Non-flammable synthetic liquid impregnant
5. Craft tissue insulation
6. Aluminum foil electrodes
7. KVAR size shall be as required to correct motor power factor to 90 percent or better and shall be installed on all motors 5 horsepower and larger, that have an uncorrected power factor of less than 85 percent at rated load.

B. Disconnect Switches

1. Fusible switches: fused, each phase; general duty; horsepower rated; non-teasible quick-make, quick-break mechanism; dead front line side shield; solder less lugs suitable for copper conductors; spring reinforced fuse clips; electro silver plated current carrying parts; hinged doors; operating lever arranged for locking in the "OPEN" position; arc quenchers; capacity and characteristics as indicated.
2. Non-fusible switches: for equipment 1 horsepower and smaller, shall be horsepower rated; toggle switch type; quantity of poles and voltage rating as indicated. For equipment larger than 1 horsepower, switches shall be the same as fusible type.

PART III - Execution

A. NOT USED.

END OF SECTION 15030